SEQUENTIAL REASONING TESTING SYSTEM AND METHOD

BACKGROUND OF THE INVENTION

Cross-Reference to Related Application

5   This application is a continuation of and incorporates by reference co-pending Application Ser. No. 10/123,037, filed 4/15/2002, now Pat. No. 6,663,392, which application claims priority to provisional application 60/285,950, "Sequential Reasoning Testing System and Method," filed April 24, 2001, both of which are commonly owned with the present invention and which are incorporated herein by reference.

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Field of the Invention

The present invention relates to systems and methods for testing intelligence, and, more particularly, to such system and methods for testing working memory and/or fluid reasoning.

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Description of Related Art

Tests are known in the art for testing a subject's ability to fill in a pattern of images, including those that present a series of images to the subject for subsequent filling in one of a plurality of other images (Clark, U.S. Pat. No. 1,139,256), complete a pattern (Press,

20   U.S. Pat. No. 3,543,418), or perform a matching task (Miller, U.S. Pat. No. 5,533,902; Reynolds et al., U.S. Pat. No. 5,911,581; Hersh, U.S. Pat. No. 6,030,226).

However, there are no tests known in the art that also require an additional memory dimension imposed by removing presented images sequentially.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a system and method for testing a subject's working memory.

It is a further object to provide such a system and method for testing fluid reasoning.

5 It is another object to provide such a system and method for testing a combination of working memory and fluid reasoning.

It is also an object to provide such a system and method that provide for adaptive administration.

It is an additional object to provide a method for administering such a test.

10 It is yet a further object to provide a series of representations for use in such a test.

These and other objects are achieved by the present invention, a method for testing a working memory and fluid reasoning of a subject. The method comprises the step of sequentially presenting to a subject a first plurality of images. Each image is positioned in a different sector of a display device. The first plurality of images totals one fewer than

15 a total number of sectors.

Next the subject is simultaneously presented with a second plurality of images. One of the second plurality of images bears an analogous relationship to the first plurality of images.

The subject is then asked to select an analogous image from the second plurality

20 of images.

The features that characterize the invention, both as to organization and method of operation, together with further objects and advantages thereof, will be better understood from the following description used in conjunction with the accompanying drawing. It is to

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be expressly understood that the drawing is for the purpose of illustration and description and is not intended as a definition of the limits of the invention. These and other objects attained, and advantages offered, by the present invention will become more fully apparent as the description that now follows is read in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A,1B is a flowchart outlining an administration of the test of the present invention.

FIGS. 2A-2D is an exemplary series of image cards, including three image cards (FIGS. 2A-2C) and an answer selection card (FIG. 2E).

FIGS. 3A,3B are schematic diagrams of a manual (FIG. 3A) and an automated (FIG. 3B) system for administering a test.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A description of the preferred embodiments of the present invention will now be presented with reference to FIGS. 1A-3B.

An exemplary flowchart of the test administration method (FIGS. 1A,1B) outlines steps to be taken in giving the working memory and fluid reasoning test **10** for presentation to a subject **20**. The method comprises the steps of determining demographic information on the subject **20** (block **101**) for the purpose of choosing an appropriate test level (block **102**) to be presented. Such demographic information typically includes, but is not intended to be limited to, the subject's age and/or grade level.

Next the subject **20** is presented with a first representation of one of a first plurality of images (block **103**). In a first embodiment, this first representation comprises a card or sheet of paper with a matrix of sectors, here four **31-34**, thereon, with one of the sectors having a first image therein. An exemplary first representation **30** is given in FIG. 2A, wherein an image **35** of four dots is shown as being positioned within a first sector **31**. Sectors **32-34** are blank. Next the subject **20** is asked to look at the first image **35** and remember it (block **104**).

The subject **20** is then presented with a second representation **40** of a second of the first plurality of items (FIG. 2B, block **105**), with a second image **36** of a square in the second sector **32**. Sectors **31,33,34** are blank. The subject **20** is then asked to look at the second image **36** and remember it (block **106**).

This process is repeated $n-1$ times (blocks **107-108**), where n is the number of sectors on the matrix. Here, $n=4$, and thus the third presentation **50** is the final one, with a pentagonal figure **37** shown in sector **33** (FIG. 2C), and sectors **31,32,34** are blank. It is obvious to one of skill in the art that n may equal any reasonable number, with n typically an even integer; 4 and 6 are typical numbers.

When all representations **30,40,50** have been viewed, the subject **20** is presented with an nth, here a fourth, representation **60** (FIG. 2D) on an "answer card" **66** (block **109**) and is asked to select an analogous image from a second plurality of images **61-65** (block **110**). The second plurality of images may comprise a reasonable number from which to choose, typically 4 or 5, although this is not intended as a limitation.

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In the test comprising representations as shown in FIGS. 2A-2D, the correct choice would be image **61**. If a predetermined time **19** is exceeded by the subject **20** in making a selection (block **111**), prompting is given by the test giver **21** (block **112**). If an incorrect answer is given (block **113**), the subject **20** is asked to select another image from the second plurality of images (block **114**). The results are recorded (block **115**). Once the test **10** has been completed (block **116**), it is scored (block **117**), the score indicative of a working memory and fluid reasoning ability of the subject **20**.

One of skill in the art will recognize that a "manual" or "automated" test administration mode may be contemplated. In a manual mode (FIG. 3A), picture cards **30,40,50** such as those illustrated in FIGS. 2A-2C and an answer representation card **60** such as that illustrated in FIG. 2D are shown to the subject **20** by a human test giver **21**, who also manually records the times **19** and responses on a form **29**. Scoring may be done either by the test giver **21** or by another entity, such as a testing corporation or computer.

In an automated embodiment (FIG. 3B), the "test giver" comprises a computer **22** having resident thereon a software package **23** adapted to give the test in substantially the same steps as listed above. In communication with and under direction from the computer **22** is a display screen **24**, on which may be presented the representations and which, using a keyboard **31** or a pointing device such as a mouse **25** in communication with the computer **22**, the subject **20** may make selections. Other forms of receiving communication from the subject **20** may comprise such devices known in the art as a touch

screen or a microphone for voice recognition and translation, and the invention is not intended to be limited to particular input/output devices.

The computer **22** further comprises a clock **26** accessible by the software **23** for performing the timing functions. In this automated case, the prompting and asking steps

5   can be performed by displaying a statement or query on the screen **24**, or via a speaker **27** in communication with the computer **22**, under direction of the software **23**.

Scoring in this case could be performed by the software **23** resident in the computer **20**. Alternatively, the digital "scoring form," a data record, may be transmitted via modem **28** to a scoring center **80** remote from the test site **11**.

10   Another benefit of the automated embodiment of FIG. 3B is an ability to perform an adaptive administration of a test. In this case a contemporaneous evaluation of the subject **20** occurs during the test administration, and the software **23** adjusts the presentation of subsequent images based upon the results of previous portions of the test.

15   It may be appreciated by one skilled in the art that additional embodiments may be contemplated, including alternate representations of items and alternate modes of presenting the items to a subject.

In the foregoing description, certain terms have been used for brevity, clarity, and understanding, but no unnecessary limitations are to be implied therefrom beyond the

20   requirements of the prior art, because such words are used for description purposes herein and are intended to be broadly construed. Moreover, the embodiments of the apparatus

illustrated and described herein are by way of example, and the scope of the invention is not limited to the exact details of construction.

Having now described the invention, the construction, the operation and use of preferred embodiment thereof, and the advantageous new and useful results obtained 5   thereby, the new and useful constructions, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.